

**Factors Associated with viral non-suppression among Adolescents Living with HIV at Lira
Regional Referral Hospital (LRRH): A cross sectional analytical study**

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Abstract

Purpose : WHO defines viral load non-suppression as viral load ≥ 1000 copies/ml. Within a year of attaining the “90- 90-90” target, current records show that 53% of people living with HIV (PLWH) have viral non-suppression worldwide. Despite a continuing global trend of fewer AIDS-related deaths in children and adults, the opposite has occurred among adolescents aged 10-19 years. However, results on viral non-suppression among adolescents suggest that antiretroviral therapy outcomes for adolescents from both high-income and low-income settings tend to be worse than for adults. In Uganda, the proportion of viral non-suppression among adolescents countrywide is 27%. In Lira Regional Referral Hospital, almost 30% of these adolescent patients developed viral non-suppression within one year after starting antiretroviral therapy. This study aimed to investigate factors associated with viral non-suppression among Adolescents living with HIV at Lira Regional Referral Hospital (LRRH)

Methods: A cross sectional analytical study was conducted with a mixed methods approach on a simple random sample of adolescents living with HIV aged between 10-19 years attending the antiretroviral therapy clinic at LRRH. Data was collected using a researcher-administered questionnaire on health-facility, care-giver and behavioral factors associated with viral load non-suppression. 5 key informant interviews were also conducted to further understand viral load non-suppression among adolescents.

Results: The level of viral non-suppression was 69% with a mean age of 16.44 and standard deviation of 1.74. Females made up 55.5% of our respondents. Having lived with HIV/AIDS for 3-6 years (AOR: 4.28, 95% CI: 2.94-15.01, p-0.000) and being an alcohol consumer (AOR: 5.88, 95% CI: 2.78-11.85, p-0.009) were positively associated with viral load non-suppression. A positive attitude of health workers (AOR: 0.16, 95% CI: 0.08-0.46, p-0.002) and having received continuous counseling from the counsellor at the facility (AOR: 0.15, 95% CI: 0.09-0.55, p-0.000) were independently negatively associated with viral non-suppression.

Conclusions: Viral load non-suppression was more likely if an individual was an alcohol consumer and less likely if the health workers had a positive attitude or were under continuous counselling from the counselor at the Healthy facility. At the Healthy facility, there is need to set up adolescent friendly clinics and ensure a positive attitude of health workers towards adolescents living with HIV. Key programs that support continuous counselling of adolescents living with HIV should also be set up at the facility to ensure that the Adolescents are supported.

Background

In 2014, the Joint United Nations Programme set the 90–90–90 strategy to end HIV/AIDS by 2030 (Agolory et al., 2018). This goal stipulates that by the end of 2030, 90% of people living with HIV will know their HIV status; 90% of people with diagnosed HIV infection will receive sustained antiretroviral therapy; and 90% of people receiving antiretroviral therapy will have achieved viral suppression (UNAIDS, 2020).

Statistics by Owaraganise et al., (2019), show that in June 2018, Lira Regional Referral Hospital had up to 397 adolescents (10-19 years) enrolled on antiretroviral therapy, however, almost 30% of these adolescent patients developed viral non-suppression within one year after starting antiretroviral therapy which has resulted into opportunistic infections and deaths of these adolescents.

In recent years, substantial achievements have been made in ensuring that there is access to antiretroviral therapy (ART) for people living with Human Immunodeficiency Virus (HIV) (UNAIDS, 2019). The major goal of antiretroviral therapy is to suppress the replication of the Human immunodeficiency virus and suppressed viral replication restores the immune function and also decreases the danger of HIV transmission (Kiragga et al., 2018). In 2013, the World Health Organization (WHO) presented viral load monitoring as a gold standard to follow up the treatment effectiveness of HIV (Rosenberg, 2018).

Considering the HIV infection in different age groups, the adolescents who were living with HIV/AIDS had reached 2.1 million in 2015 according to the (UNAIDS, 2020); two thirds of these infections were among adolescent girls. (Idele et al., 2019), further adds that, AIDS-related deaths are not decreasing among the adolescent age group i.e.a 50% (71,000 in 2005 - 110,000 in 2019) increase in AIDS-related deaths was recorded among adolescents contrary to a 32% decrease in other age groups. Given this increasing trend, AIDS was ranked the second most

common cause of death among adolescents globally (UNAIDS, 2014). However, AIDS related deaths can only reduce if there is at least 65% reduction in AIDS-related deaths among adolescents worldwide (UNAIDS, 2020).

In Africa, where the burden of HIV epidemic is heavily felt, over 7.5 million people received ART by the end of 2012, an increase from 50 000 people recorded over a decade earlier. At the same time, about 12.3 million people were eligible for ART in 2012 (WHO, 2019). In fact, two out of three global regions found with the majority number of new HIV infections (2000–2018) among adolescents aged 15–19 were located in Africa (i.e. Eastern and Southern Africa with 150,000; western and central Africa with 50,000 new infections).

Going by the incidence and prevalence of HIV infection, Sub Saharan Africa is the most hit region by the HIV pandemic in the world. In 2013, the region was home to 83% of adolescents living with HIV globally. This is because almost half of all HIV positive adolescents in the world were in six countries (Ethiopia, India, Kenya, Nigeria, Tanzania and South Africa). The AIDS related deaths in this region though declining were still high with 790 000 deaths recorded among all age groups (UNAIDS, 2020).

Results on viral non-suppression among adolescents also suggests that antiretroviral therapy outcomes for adolescents from both high income and low-income settings tend to be worse than for adults (Goemaere et al., 2019). Similarly, several studies conducted in Europe and South America comparing non-viral suppression between adolescents and adults has shown low levels of viral non-suppression among adolescents than the adult population (Atuahene, 2019).

Information from African countries has indicated that nearly 30% of adolescents on treatment develop viral non-suppression in a period of six years after starting antiretroviral therapy (Giordano et al., 2019). In two studies done in South Africa, adolescents on antiretroviral therapy are likely to have an unsuppressed viral load and more likely to fail virologically compared to

adults (Evans et al., 2018; Nglazi et al., 2019). Another study in Uganda found that adolescents are almost twice as likely to have virological failure compared to adults (Kamya et al., 2019).

According to the Uganda viral load dashboard, the proportion of viral non-suppression among adolescents countrywide is 27% (Owaraganise et al., 2019). So far, obstacles to and factors that promote viral non-suppression have been identified and some of these obstacles among adolescents include stigma, missed appointments, being sick, medication taste, strong religious beliefs, clinic-related factors, pill burden, drug toxicity and resistance, loss of a mother, and poor knowledge about HIV (Galea et al., 2018).

Despite the different interventions put in place to fight viral non-suppression among these adolescents living with HIV such as counseling, involvement of family and schools in adolescent care and ensuring availability of free ARVs among others, there is an increasing concern around treatment failure, drug resistance, and late drug toxicities related with lasting use of antiretroviral therapy in Lira district (Kiweewa et al., 2019). This background formed the need for this study that sought to investigate the factors associated with viral non-suppression among adolescents living with HIV at Lira Regional Referral Hospital (LRRH).

Study Setting

The study was conducted in Lira City in Northern Region of Uganda. Lira Regional Referral Hospital formed our study area and it is the referral hospital for the districts of Amolatar, Apac, Dokolo, Lira, Kole and Oyam. It is located along Police Road, in the central business district of Lira Town, approximately 342 kilometers (213 miles), by road, north of Kampala, Uganda's capital and largest city (Lira District Local Government, 2020). This is approximately 111 kilometers (69 miles), by road, southeast of Gulu Hospital the nearest other regional referral hospital.

The hospital offers surgical, medical, pediatrics, obstetrics and gynecology, psychosocial programs, diagnostics and pharmaceutical services. The hospital also has an ART Clinic that is run by doctors who have specific training in managing HIV/AIDS and this offers treatment to patients getting sick and bed ridden with HIV/AIDS. It also offers counseling services to these patients after getting antiretroviral therapy. All these services offered by Lira Regional Referral Hospital are free of charge since it's a government hospital.

Study design, population and sampling

This was a cross sectional study design with a mixed methods approach involving both quantitative and qualitative methods. This study design was preferred for this study because data from respondents was collected at a single point in time without repetition from the representative population, and qualitative approaches. It was also used because it helped the researcher to capture information based on data gathered for a specific point in time. The data gathered was from a pool of participants with varied characteristics and demographics known as variables. The study population comprised of adolescents, both female and male, aged between 10 to 19 years. Using the hospital records, these participants were identified on the basis of their demographic information and the period under which they have been on ART. According to the LRRH health system records, there are on average 1000 adolescents living with HIV attending the ART clinic at the facility on an annual basis. However, only 500 adolescents who had been on ART for at least 6 months were included in this study. Adolescents whose caretakers or guardians could not consent to the study and those that did not assent to the study were excluded from the study.

Study variables

The dependent variable was viral load non-suppression whereas the independent variables included socio-demographic, Health facility, Behavioral and caregiver factors.

Data collection

To ensure accuracy, quality control measures were put in place through pre-testing of the tools, training the research assistants and editing of the data from time to time. Competent research assistants with suitable knowledge on HIV among Adolescents were recruited and trained on how to collect data. Researcher-administered interviews and key informant interviews were used during the data collection exercise.

Data analysis

At univariate analysis, descriptive analysis was done using SPSS version 20. Frequencies and percentages for different variables were (percentage) in bar charts with one bar for each response category. This data was presented using tables. At bivariate analysis, to determine the factors associated with viral non-suppression among adolescents living with HIV, crude Odds ratio (COR) with their 95% CI was estimated using a multivariate logistic regression model to assess for statistically significant associated factors for viral non-suppression among adolescents living with HIV. Entering each variable in the model ta time. A multivariate regression analysis was also done to understand the level and strength of the factors associated with viral non-suppression among adolescents living with HIV. Only the significant variables at bivariate level of analysis were considered for multivariate analysis were the odds ratios and their respective confidence intervals were determined. The level of statistical significance was determined at (p-value - 0.05).

Qualitative data analysis was also used and data was edited and reorganized into meaningful phrases. In other words, a thematic approach was used to analyze qualitative data where themes, categories and patterns were identified. The recurrent themes, which emerged in relation to each guiding question from the interviews, were presented in the results, with selected direct quotations from participants presented as illustrations.

Ethical Consideration

Ethical clearance was obtained from Clarke International University Research Ethics Committee- CIU-REC. (reference number CLARKE-2021-71), an introduction letter from the university seeking to introduce the researcher to the healthy facility was used to approach the health leadership at the Healthy facility. Informed consent was also obtained from adolescents whereas parents or caregivers assented for the particular adolescents who could not consent on their own. This was done after enlightening sufficiently the purpose, process and predicted benefits of the study to the caregivers.

Results

Viral non-suppression status among adolescents living with HIV at LRRH

The viral non-suppression status among adolescents living with HIV at LRRH

Variable	Frequency, n	Percentage, %
Last/current patient's VL level recorded		
>1000 copies/ml	138	69.0
< 1000 copies/ml VL	62	31.0

When the viral load results of the last test was reviewed, nearly seven in every ten, 69% of the participants had a viral load reading of more than 1000 copies/ml while the 31% had < 1000 copies/ml.

Multivariate analysis factors associated with viral non-suppression among adolescents living with HIV at LRRH

Variable	COR	COR (95% CI)		P-value	AOR	95% CI		P-value
		Lower	Upper			Lower	Upper	
Duration lived with HIV/AIDS								
Less than 3 years	5.133	1.990	13.243	0.001	1.182	0.127	7.041	0.634
3-6 years	11.798	4.948	28.132	0.000	4.280	2.944	15.011	0.000*
≥7years	1.0				1.0			
Attitude of the health care workers								
Positive	0.143	0.76	0.614	0.000	0.157	0.083	0.456	0.002*
Negative	1.0				1.0			
Receive continuous counseling from the counselors at the health facility								
Yes	0.390	0.157	0.889	0.026	0.153	0.088	0.555	0.003*

No	1.0				1.0			
Drink alcohol								
Yes	3.663	1.431	7.414	0.000*	5.882	2.778	11.851	0.009*
No	1.0				1.0			

*Primary data, *- Significance, COR=Crude Odd Ratio, CI=Confidence Interval, AOR=Adjusted Odd Ration*

On adjustment of factor that were significant at bivariate level, viral non-suppression was high among respondents who had lived with HIV/AIDS for 3-6 years (AOR: 4.280, 95% CI: 2.944-15.011, p=0.000) and alcohol consumers (AOR: 5.882, 95% CI: 2.778-11.851, p=0.009). While viral non-suppression was low among those who rated the attitude of the health workers at the facility as positive (AOR: 0.157, 95% CI: 0.083-0.456, p=0.002) and having received continuous counseling from the counsellor at the facility (AOR: 0.153, 95% CI: 0.088-0.555, p=0.000).

Discussion

The study found that the prevalence of viral non-suppression was 69% among adolescents with HIV. This is not in line with Atuahene, 2019) Giordano et al., (2019) who indicated that almost 30% of adolescent on treatment develop viral non-suppression in a period of six years after starting antiretroviral therapy (Giordano et al., 2019) and a study in Uganda found that adolescents are almost twice as likely to have virological failure compared to adults, children under 15 years continued to have much lower rates of viral suppression compared to adults (Kamya et al., 2019). On the contrary, MoH, (2017) found that 40% had achieved viral suppression (MoH, 2017). On the contrary, Asire, (2019) found that viral load non-suppression rate was 21.9% (Asire, 2019). As well as a mixed method design among 334 adolescents aged 10-19 years on antiretroviral therapy also found that the prevalence of non-suppressed viral load was 30.8% (Nabukwasi, 2018).

It was noted that most of the adolescents are trying to achieve viral suppression although there is still need for more to be done since the statistics from the ART clinic showed that most adolescents had viral load results that were greater than 1000 copies/ml.

The study also found out that attitude of health workers was significantly associated with viral non-suppression; having positive health workers attitude facility was associated with decreased

chances of viral non-suppressions (AOR 7.542, 95% CI: 5.131-14.690, p=0.000). This is because they may abuse patients; some nurses are rude and harsh towards patients and health workers often give immediate and high-quality treatment to patients they know. This is in line with Kolab et al. (2018) who showed that the possibility of having viral non-suppression remained considerably greater amongst adolescents who received the right care from health workers with positive attitudes (aOR = 1.81, 95% CI 1.05–4.08) and those who were receiving care and treatment from a clinic of professional healthcare workers (aOR = 2.95, 95% CI 1.56–5.59). Furthermore, Wambugu et al. (2017) found out that good caregiver-provider relationship and viral non-suppression among adolescents with health care services have shown positive association with viral suppression among adolescents (aOR= 1.29; 95% CI= 1.04 – 1.59). There are not clear reasons for the differences in the study findings. However, with Mujugira (2019) who revealed that poor health workers' attitudes are positively associated with viral non-suppression among adolescents (aOR= 1.29; 95% CI= 1.04 – 1.59).

In the study, receiving continuous counseling at the facility was associated with low chance of viral non-suppressions among the study participants (AOR: 6.458, 95% CI: 3.085-8.441, p=0.040). This is in line with finding by Natukunda et al. (2019) where continuous counseling >95% (aOR 2.73, 95% CI 1.09 to 6.82) was associated with viral suppression. It is worth noting that counseling is a key requirement for successful ARV adherence. Furthermore, the frequency and quality of counseling was found to differ greatly both between the different countries and among the different facilities within each country.

This study also found that viral non-suppression was high among alcohol consumers. This is probably because drinking alcohol is associated with forgetfulness and poor adherence which always escalate to increase in viral load counts. This is similar to a study by Jordan et al., (2018) who found that adolescent patients on ART who self-confessed that they used alcohol daily were four times likely to be virally unsuppressed as compared to adolescents on ART who did not take

alcohol (OR=3.81, p=0.01). Furthermore, Nachega et al., (2009) found that adolescent's viral non-suppression indicated behavioral factors such as alcohol consumption (8.2%; 95%CI, 4.2% – 15.3%). In addition, alcohol drinking by the adolescent increased the odds of virological failure (aOR = 0.69, 95% CI 0.50 to 0.97) (Sithole et al., 2018).

Social and psychological support was not significantly associated with viral non-suppression in this study. This disagrees with Li et al., (2019) where social support found different types of social support, including practical/instrumental support, and emotional support as important to achieve viral suppression among HIV positive adolescents. Whereas practical/instrumental support comprises activities such as picking up medications, paying for prescriptions or physical assistance, emotional support includes encouragement, listening, nourishment and informational support (Scheurer et al., 2019).

In this study, relationship between caregiver and the child was not significantly associated with viral non-suppression. This is contrary to Cyrus et al (2016) who showed that there is a positive association between caregiver relationship with adolescents and viral non-suppression (aOR = 3.32, 95% CI: 1.13 to 9.81). It was however noted that Caribbean-born Black adolescents living with HIV infection are less likely than other racial/ethnic groups to be retained in care and/or achieve viral suppression.

Study Strength and Limitations

The study involved quality control measures at all levels through pre-testing of the tools, training the research assistants and editing of the data from time to time. It also involved recruiting competent research assistants with suitable knowledge on HIV among Adolescents. However, the COVID-19 pandemic limited timely data collection to inform the findings.

Conclusion

The level of viral non-suppression was high as 69% of the participants had their last viral load results of more than 1,000 copies/ml. Having lived with HIV/AIDS for 3-6 years was associated with increased chance of having viral non-suppression in this study compared to those who had the disease for at least seven years. Rating the health workers as having positive attitude was negatively associated with having viral non-suppression, meaning those that on who rated the health workers attitude as positive were having viral suppression. Respondents who had received continuous counselling had decreased chance of having viral non-suppressions.

Viral non-suppression was high among participants who consume alcohol.

Recommendation

To ensure that adolescents living with HIV virally suppress, the study recommends setting up of Adolescent friendly clinics to manage young people as these individuals have different needs as compared the adults. Adherence is imperative for viral load suppression and should be assessed at every visit to identify and address possible barriers to adherence among HIV positive young people who underwent intensive adherence counselling. The study also recommends close follow up and intensified targeted adherence support for suspected treatment failures, repeat testers after suspected failure, and adherence to ART guidelines by ART clinics. Interventions such as targeted adherence counselling, differentiated care models (including community-based ART delivery), and targeted resistance testing are required to prevent virologic failure.

Involvement of peers to provide PSS and DOTS, regular home visits by peer educators or health workers, active involvement of young people living with HIV in their own care plan.

Emphasis on the need for psychosocial support in health care units such as peer to peer counseling aid in the activity of the health workers that the respondents may deem negative.

Qualitative research to explore factors influencing viral non-suppression not asked in routine psychosocial assessments.

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